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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/305,121	05/04/99	GUNAPALA S	06816/065002

MMC1/0928

SCOTT C HARRIS
FISH AND RICHARDSON PC
SUITE 1400
4225 EXECUTIVE SQUARE
LA JOLLA CA 92037

EXAMINER	
BAUMEISTER, B	
ART UNIT	**PAPER NUMBER**
2815	9

DATE MAILED: 09/28/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No. 09/305,121	Applicant(s) Gunapala et al.
	Examiner William Baumeister	Group Art Unit 2815

☒ Responsive to communication(s) filed on *Jul 13, 2000* .

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *3* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) *1, 3, 4, 9, and 11-20* is/are pending in the application.

Of the above, claim(s) *9 and 15* is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) *1, 3, 4, 11-14, and 16-20* is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☒ The drawing(s) filed on *May 4, 1999* is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐approved ☐disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____ .

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____ .

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☒ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

— SEE OFFICE ACTION ON THE FOLLOWING PAGES —

DETAILED ACTION

Election/Restriction

1. In paper #6, the Office issued a restriction between inventions I and II. Invention I was further restricted between inventions IA and IB. Applicant elected without traverse invention I in paper #8, without further electing between inventions IA and IB. In a telephone conversation with applicant's representative, Mr. Bing Ai, on September 6, 2000:

a. Applicant further elected without traverse invention IA.

b. Applicant further confirmed that the Office's provisional interpretation of claims 17-20, set forth in footnote 1 of the Restriction Requirement (paper #6), is the intended interpretation.

Accordingly, claims 1, 3, 4, 9, 11-20 are pending. Claims 9 and 15 are withdrawn from consideration as being directed towards non-elected inventions.

Drawings

2. The drawings are objected to because:

a. FIG. 1 is partially illegible, and FIG. 3A is fully illegible.

b. Some labels of FIG. 1 do not appear to coincide with the description set forth in the specification. For example, page 5, first full paragraph recites that electrons are promoted from subband 101 to subband 106. However, electrons are depicted as being promoted from subband 1?2 to subband 10? and holes are promoted from subband 102/106(?) to subband 104.

c. FIG 12 includes a typographical error in the label "MWIR QWIP," setting forth "WMIR QWIP."

Applicant must correct these and any other minor informalities not specifically mentioned.

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1, 3, 4 and 11-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites, "each photodetector having two quantum well structures stacked over each other ..." at lines 5-6. Similarly, **claim 17** recites, "each photodetector formed of alternating quantum wells of a first type and a second type with different active layers stacking to one another..."

It is unclear how both structures can be stacked over each other, rendering the claims indefinite. The Office provisionally interprets the limitation to read, "each photodetector having two quantum well structures, one stacked over the other, and each comprising..." However, appropriate correction is required to confirm this interpretation.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

7. Insofar as definite, claims 1, 16-18 and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Liu '421. Liu teaches multicolor QWIPs wherein each superlattice section of the detector operates by bound-to-quasibound transitions. Further Liu, teaches that the detector may be fabricated from a variety of materials including GaAs-AlGaAs and InGaAs-AlGaAs systems (col. 3, lines 4-)

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Insofar as definite, claims 1, 11-13, 17, 18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai et al., Two-color infrared photodetector using GaAs/AlGaAs and strained InGaAs/AlGaAs multiquantum wells [hereinafter Tsai] in view of Liu '421.

a. Tsai teaches a dual-color QWIP stack having a GaAs/AlGaAs superlattice for detecting at 8 microns (long-IR wavelength) and a InGaAs/AlGaAs superlattice for detecting at 5.3 microns (mid-IR wavelength). Both sets of superlattices have barriers composed of $Al_{0.27}Ga_{0.73}As$ barriers. The MIR detector is disclosed as operating by bound-to-quasicontinuum (or bound-to-quasibound) transitions, but the LIR is disclosed as operating by bound-to-continuum transitions (page 3504, col. 2), as distinguished from the present invention wherein both of the detectors operate by bound-to-quasicontinuum transitions.

b. Liu teaches multicolor QWIPs wherein each superlattice section of the detector operates by bound-to-quasibound transitions. Further Liu, teaches that the detector may be fabricated from a variety of materials including GaAs-AlGaAs and InGaAs-AlGaAs systems (col. 3, lines 4-) Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to design wells and barriers of the GaAs/AlGaAs detector of the Tsai device to operate by bound-to-quasibound transitions for the purpose of increasing the detectors efficiency as taught by Liu (e.g., col. 1, lines 52-64)

10. Claims 3, 4, 14 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Liu or alternatively over Liu/Tsai as applied to the claims above, and further in view of Bethea et al. '685.

a. Regarding claims 3 and 4, Liu and Tsai each teach QWIP stacks wherein the sections are serially connected, and thus do not include an intermediate contact structure. Bethea teaches that QWIP stacks wherein the sections are separated by an intermediate contact layer (see e.g., FIG 7). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide an intermediate contact between the superlattice sections of either the Liu QWIP or the Tsai QWIP for the purpose of enabling individual control, operation or readout of each of the QWIP sections of those devices.

b. Regarding claims 14 and 19, neither Liu nor Tsai appears to disclose the further inclusion of random reflectors. Nonetheless, Bethea discloses that the QWIP detector arrays may further comprise gratings or "diffusely scattering (roughened) surfaces" (or random reflectors). (Col. 4, lines 15-21) Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ random reflectors in either the Liu or Tsai QWIPs for the purpose of increasing coupling, as taught by Bethea.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Tidrow et al., "Grating coupled multicolor quantum well infrared photodetectors," Appl. Phys. Lett, 67 (13), 25 September 1995, pages 1800-1802.

b. Tidrow et al., "A high strain two-stack two-color quantum well infrared photodetector,"Appl. Phys. Lett, 70 (7), 17 February 1997, pages 859-861.

c. Fiore et al., "Strained InGaAs/AlGaAs quantum well infrared detectors at 4.5 microns," Appl. Phys. Lett, 64 (4), 24 January 1994, pages 478-480.

INFORMATION ON HOW TO CONTACT THE USPTO

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to the examiner, **B. William Baumeister,** whose telephone number is **(703) 306-9165.** The examiner can normally be reached Monday through Friday, 8:30 a.m. to 5:00 p.m. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

B. William Baumeister

September 26, 2000

Mahshid Saadat

Mahshid Saadat
Supervisory Patent Examiner
Technology Center 2800